

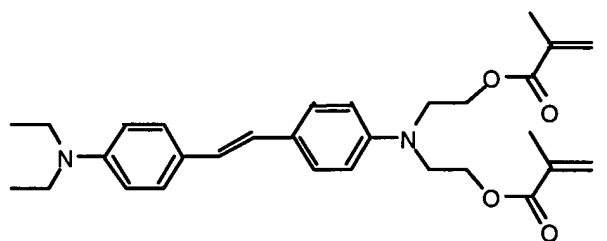
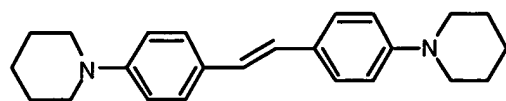
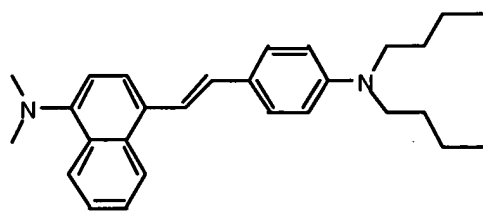
Listing of Claims:

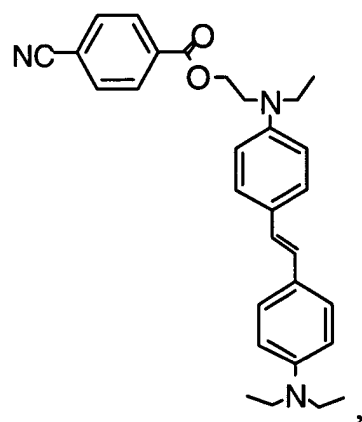
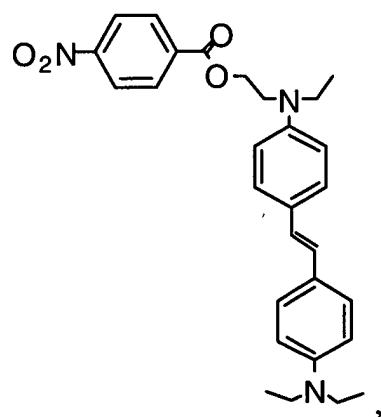
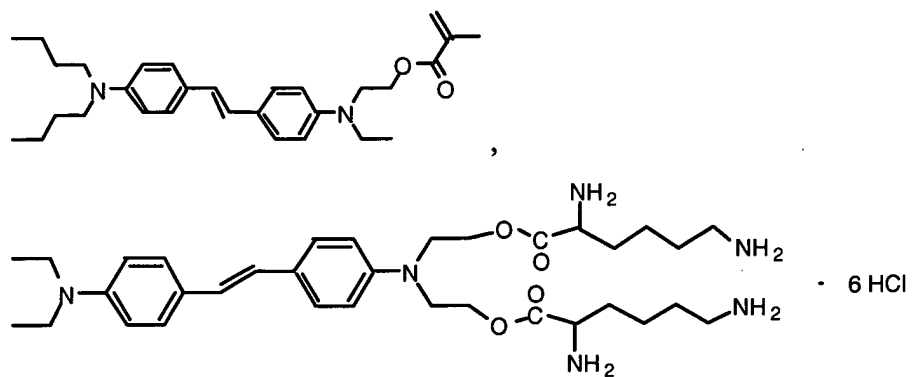
1-2. (Cancelled)

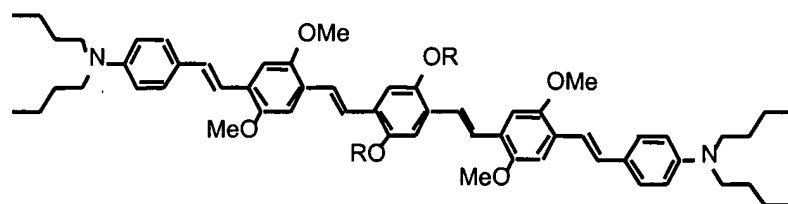
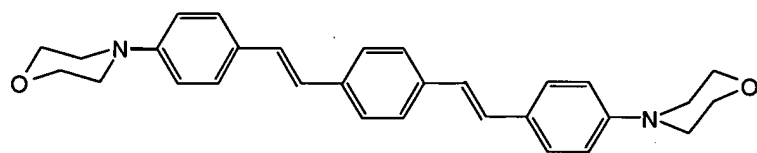
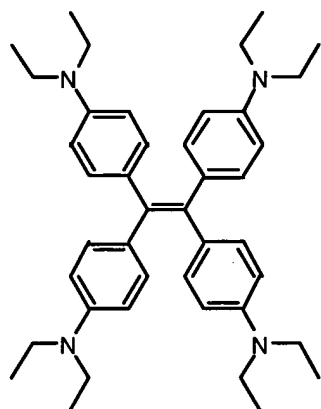
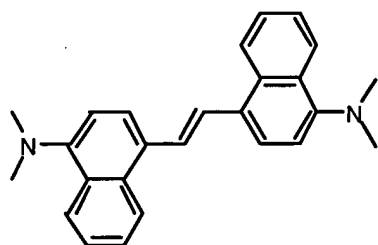
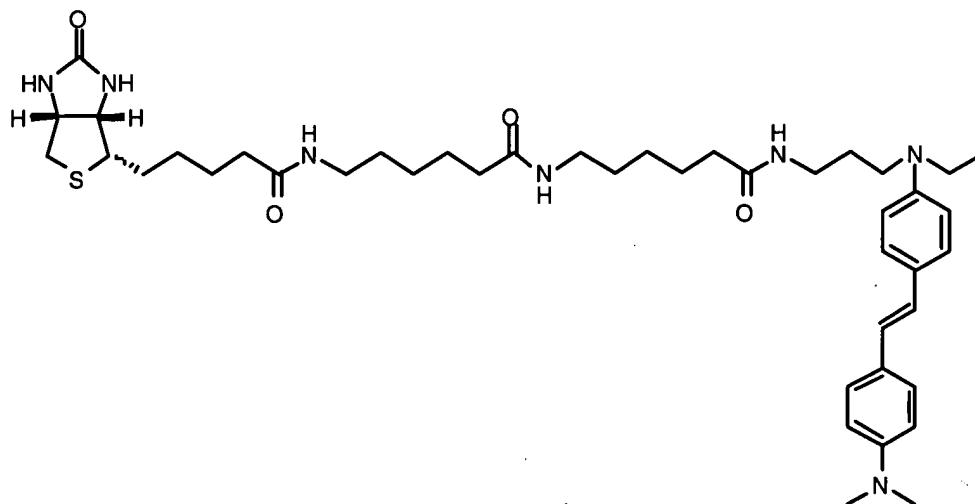
3. (Previously presented) A method for preparing a compound in an electronically excited state, comprising the steps of:

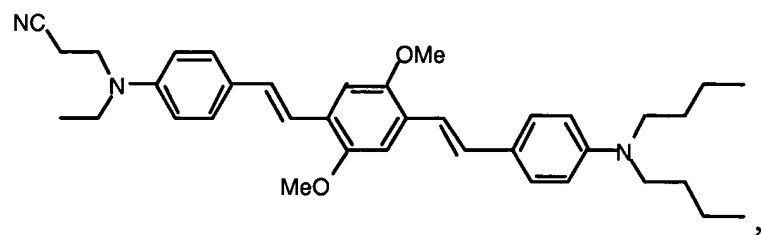
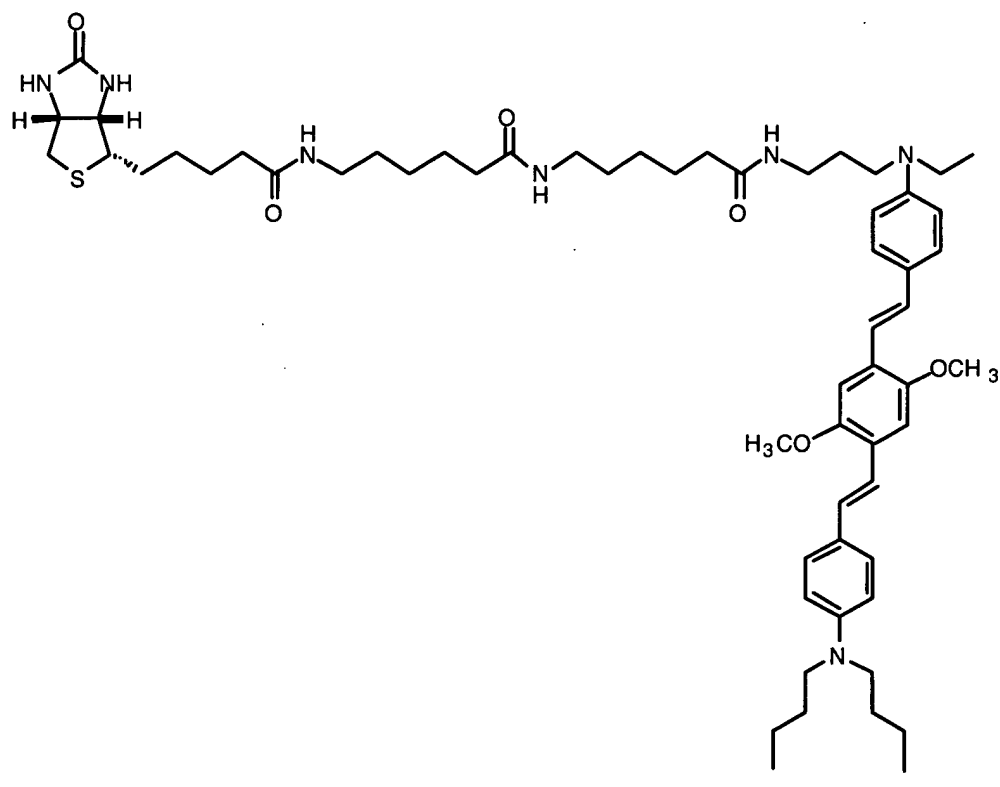
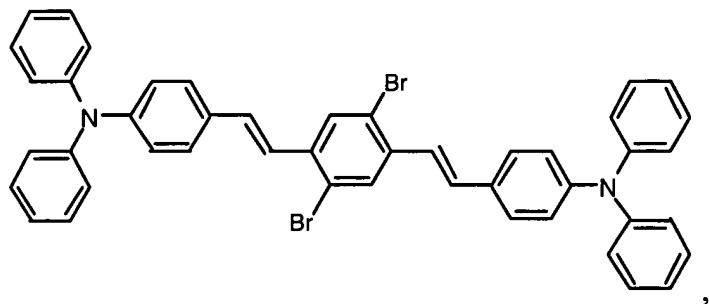
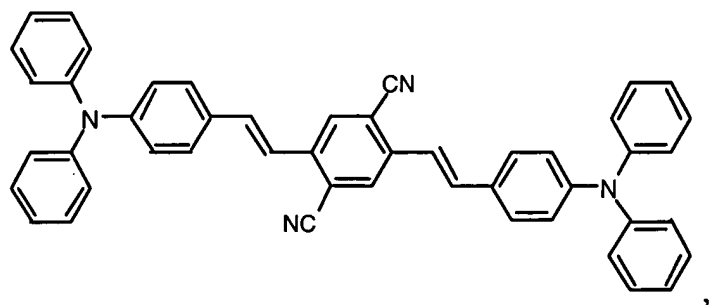
a) exposing a compound having the formula D_1 - Π - D_2 to radiation, wherein D_1 and D_2 are electron donor groups; and Π comprises a bridge of π -conjugated bonds connecting D_1 and D_2 ; and

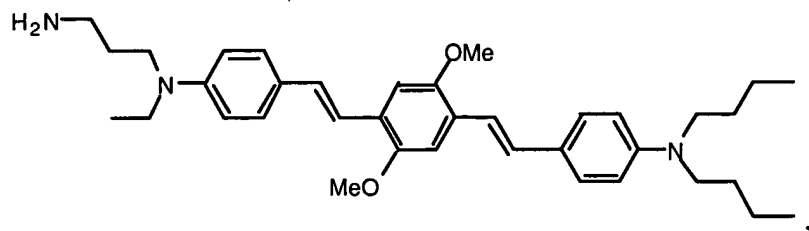
b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state, wherein said compound is selected from the group consisting of







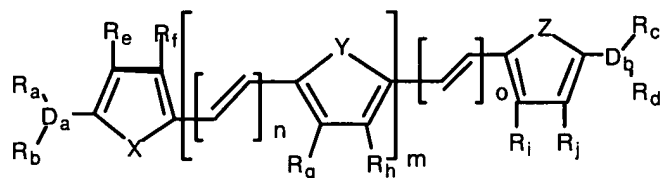




and mixtures thereof, where $R=(CH_2)_{11}CH_3$.

4. (Currently Amended) A method for preparing a compound in an electronically excited state, comprising the steps of:

- a) exposing a compound having the formula $D_1-\Pi-D_2$ to radiation, wherein D_1 and D_2 are electron donor groups; and Π comprises a bridge of π -conjugated bonds connecting D_1 and D_2 ; and
- b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state, wherein said compound is further defined by a formula



where D_a is selected from the group consisting of N, O, S and, P and not present;

where D_b is selected from the group consisting of N, O, S and, P and not present;

m, n, o are integers such that $0 \leq m \leq 10$, $0 \leq n \leq 10$, $0 \leq o \leq 10$, and $m + n + o \geq 1$; and

where:

X, Y, Z are independently selected from the group consisting of: $CR_k=CR_l$; O; S; and $N-R_m$;

R_a, R_b, R_c, R_d are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where $0 < \alpha < 10$ and $1 < \beta < 25$, a group of aromatic rings having up to 20 carbons in the aromatic ring framework; fused aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins; $-(CH_2)_\delta SiCl_3$; $-(CH_2)_\delta Si(OCH_2CH_3)_3$; and $-(CH_2)_\delta Si(OCH_3)_3$; where $\delta < 25$;

wherein one of R_a and R_b is not present when R_d is O, S or not present, and wherein one of R_c and R_d is not present when R_d is O, S or not present;

$R_{a1}, R_{a2},$ and R_{a3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, and methacryloyl chloride;

$R_e, R_f, R_g, R_h, R_i, R_j, R_k, R_l$ and R_m are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$, where $R_{b1}, R_{b2},$ and R_{b3} are independently selected from the group consisting of a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof and methacryloyl chloride; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where $0 < \alpha < 10$ and $1 < \beta < 25$; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO₂; Br; Cl; I; phenyl; an acceptor group containing more than two carbon atoms; a functional group derived from an amino acid and $NR_{e1}R_{e2}$; OR_{e3} ; where R_{e1}, R_{e2}, R_{e3} are defined as for R_n and R_o , where R_n and R_o are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{g1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{g2}R_{g3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{g2}R_{g3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$;

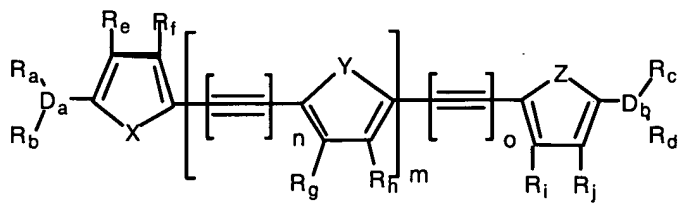
$-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Cl}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Br}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{I}$;
 $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta$ -Phenyl; aryl groups; fused aromatic rings; and polymerizable
 functionalities; and

~~R_{g1} , R_{g2} , and R_{g3} are independently selected from the group consisting of: H; a linear or
 branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; a
 polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene; cyanuric
 chloride and derivatives thereof and methacryloyl chloride~~

R_{g1} , R_{g2} , and R_{g3} are independently selected from the group consisting of: H; a linear or
 branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a
 polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene;
 cyanuric chloride and derivatives thereof; and methacryloyl chloride.

5. (Currently Amended) A method for preparing a compound in an electronically excited state,
 comprising the steps of:

- a) exposing a compound having the formula $D_1\text{-}\Pi\text{-}D_2$ to radiation, wherein D_1 and
 D_2 are electron donor groups; and Π comprises a bridge of π -conjugated bonds connecting D_1
 and D_2 ; and
- b) converting said compound to a multi-photon electronically excited state upon
 simultaneous absorption of at least two photons of said radiation by said compound, wherein the
 sum of the energies of all of said absorbed photons is greater than or equal to the transition
 energy from a ground state of said compound to said multi-photon excited state and wherein the
 energy of each absorbed photon is less than the transition energy between said ground state and
 the lowest single-photon excited state of said compound and is less than the transition energy
 between said multi-photon excited state and said ground state, wherein said compound is further
 defined by a formula



where D_a is selected from the group consisting of N, O, S, P and not present and P;

where D_b is selected from the group consisting of N, O, S, P and not present and P;

m, n, o are integers such that $0 \leq m \leq 10$, $0 \leq n \leq 10$, $0 \leq o \leq 10$, and $m + n + o \geq 1$; and

where:

X, Y, Z are independently selected from the group consisting of: $\text{CR}_k=\text{CR}_l$, $\text{CR}_k=\text{CR}_l$; O; S; and N- R_m ;

R_a , R_b , R_c , R_d are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{OR}_{a1}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{NR}_{a2}\text{R}_{a3}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CONR}_{a2}\text{R}_{a3}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CN}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Cl}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Br}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{I}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta$ -Phenyl; where $0 < \alpha < 10$ and $1 < \beta < 25$, a group of aromatic rings having up to 20 carbons in the aromatic ring framework; fused aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins; $(-\text{CH}_2)_\delta\text{SiCl}_3$; $(-\text{CH}_2)_\delta\text{Si}(\text{OCH}_2\text{CH}_3)_3$; and $(-\text{CH}_2)_\delta\text{Si}(\text{OCH}_3)_3$; where $\delta < 25$;

wherein one of R_a and R_b is not present when D_a is O, S or not present, and wherein one of R_c and R_d is not present when D_a is O, S or not present;

R_{a1} , R_{a2} , and R_{a3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, and methacryloyl chloride;

R_e , R_f , R_g , R_h , R_i , R_j , R_k , R_l and R_m are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{OR}_{b1}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{NR}_{b2}\text{R}_{b3}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CONR}_{b2}\text{R}_{b3}$, where R_{b1} , R_{b2} , and R_{b3} are independently selected from a functional group derived from an amino acid, a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof and methacryloyl chloride; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CN}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Cl}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Br}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{I}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta$ -Phenyl, where $0 < \alpha < 10$ and $1 < \beta < 25$; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO₂; Br; Cl; I; phenyl; an acceptor group

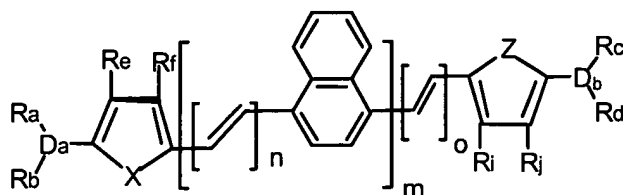
containing more than two carbon atoms; a functional group derived from an amino acid and $\text{NR}_{\text{e}1}\text{R}_{\text{e}2}$; $\text{OR}_{\text{e}3}$; where $\text{R}_{\text{e}1}$, $\text{R}_{\text{e}2}$, $\text{R}_{\text{e}3}$ are defined as for R_{n} and R_{o} , where R_{n} and R_{o} are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{OR}_{\text{g}1}$; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{NR}_{\text{g}2}\text{R}_{\text{g}3}$; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CONR}_{\text{g}2}\text{R}_{\text{g}3}$; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{CN}$; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Cl}$; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{Br}$; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}\text{I}$; $-(\text{CH}_2\text{CH}_2\text{O})_{\alpha}-(\text{CH}_2)_{\beta}$ -Phenyl; aryl groups; fused aromatic rings; and polymerizable functionalities; and

~~$\text{R}_{\text{g}1}$, $\text{R}_{\text{g}2}$, and $\text{R}_{\text{g}3}$ are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof and methacryloyl chloride~~

$\text{R}_{\text{g}1}$, $\text{R}_{\text{g}2}$, and $\text{R}_{\text{g}3}$ are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene; cyanuric chloride and derivatives thereof; and methacryloyl chloride.

6. (Currently Amended) A method for preparing a compound in an electronically excited state, comprising the steps of:

- a) exposing a compound having the formula $\text{D}_1\text{-}\Pi\text{-D}_2$ to radiation, wherein D_1 and D_2 are electron donor groups; and Π comprises a bridge of π -conjugated bonds connecting D_1 and D_2 ; and
- b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state, wherein said compound is further defined by a formula



where D_a is selected from the group consisting of N, O, S, P and not present ~~and P~~;

where D_b is selected from the group consisting of N, O, S, P and not present ~~and P~~;

m, n, o are integers such that $0 \leq m \leq 10, 0 \leq n \leq 10, 0 \leq o \leq 10$, and $m + n + o \geq 1$; and

where:

X, Y , and Z are independently selected from the group consisting of: $CR_k=CR_l$; O; S;
and N- R_m ;

R_a, R_b, R_c, R_d are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$;
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$;
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$;
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where $0 < \alpha < 10$ and $1 < \beta < 25$, a group of aromatic rings having up to 20 carbons in the aromatic ring framework; fused aromatic rings, vinyl; allyl; 4-styryl; acroyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins; $(-CH_2)_\delta SiCl_3$; $(-CH_2)_\delta Si(OCH_2CH_3)_3$; and $(-CH_2)_\delta Si(OCH_3)_3$; where $\delta < 25$;

wherein one of R_a and R_b is not present when D_a is O, S or not present, and wherein one of R_c and R_d is not present when D_b is O, S or not present;

R_{a1}, R_{a2} , and R_{a3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, and methacryloyl chloride;

$R_e, R_f, R_i, R_j, R_k, R_l$ and R_m are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$;
 $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$, where R_{b1}, R_{b2} , and R_{b3} are independently selected from a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and

derivatives thereof, methacryloyl chloride; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where $0 < \alpha < 10$ and $1 < \beta < 25$; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO₂; Br; Cl; I; phenyl; an acceptor group containing more than two carbon atoms; a functional group derived from an amino acid and NR_{e1}R_{e2}; OR_{e3}; where R_{e1}, R_{e2}, R_{e3} are defined as for R_n and R_o, where R_n and R_o are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{g1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{g2}R_{g3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{g2}R_{g3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; aryl groups; fused aromatic rings; and polymerizable functionalities; and

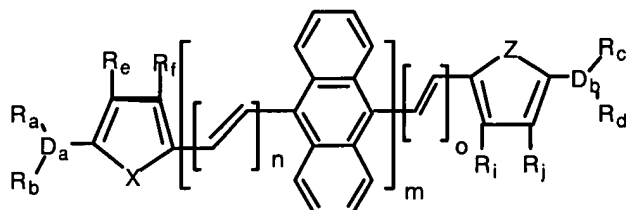
~~R_{g1}, R_{g2}, and R_{g3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof and methacryloyl chloride~~

R_{g1}, R_{g2}, and R_{g3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene; cyanuric chloride and derivatives thereof; and methacryloyl chloride.

7. (Currently Amended) A method for preparing a compound in an electronically excited state, comprising the steps of:

- a) exposing a compound having the formula D₁-Π-D₂ to radiation, wherein D₁ and D₂ are electron donor groups; and Π comprises a bridge of π-conjugated bonds connecting D₁ and D₂; and
- b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and

the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state, wherein said compound is further defined by a formula



where D_a is selected from the group consisting of N, O, S, P and not present ~~and P~~;

where D_b is selected from the group consisting of N, O, S, P and not present ~~and P~~;

m, n, o are integers such that $0 \leq m \leq 10$, $0 \leq n \leq 10$, $0 \leq o \leq 10$, and $m + n + o \geq 1$; and

where:

$X, Y,$ and Z are independently selected from the group consisting of: $CR_k=CR_l$; O; S;
and N- R_m ;

R_a, R_b, R_c, R_d are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where $0 < \alpha < 10$ and $1 < \beta < 25$, a group of aromatic rings having up to 20 carbons in the aromatic ring framework; fused aromatic rings, vinyl; allyl; 4-styryl; acrolyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins; $(-CH_2)_\delta SiCl_3$; $(-CH_2)_\delta Si(OCH_2CH_3)_3$; and $(-CH_2)_\delta Si(OCH_3)_3$; where $\delta < 25$;

wherein one of R_a and R_b is not present when D_a is O, S or not present, and wherein one of R_c and R_d is not present when D_a is O, S or not present;

$R_{a1}, R_{a2},$ and R_{a3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, and methacryloyl chloride;

$R_e, R_f, R_i, R_j, R_k, R_l$ and R_m are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$, where R_{b1} , R_{b2} , and R_{b3} are independently selected from the group consisting of a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, methacryloyl chloride;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where $0 < \alpha < 10$ and $1 < \beta < 25$; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO₂; Br; Cl; I; phenyl; an acceptor group containing more than two carbon atoms; a functional group derived from an amino acid and $NR_{e1}R_{e2}$; OR_{e3} ; where R_{e1} , R_{e2} , R_{e3} are defined as for R_n and R_o , where R_n and R_o are defined as any member of the group consisting of H; a linear or branched alkyl group with up to 25 carbons;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{g1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{g2}R_{g3}$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{g2}R_{g3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; aryl groups; fused aromatic ring; and polymerizable functionalities; and

~~— R_{g1} , R_{g2} , and R_{g3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof and methacryloyl chloride~~

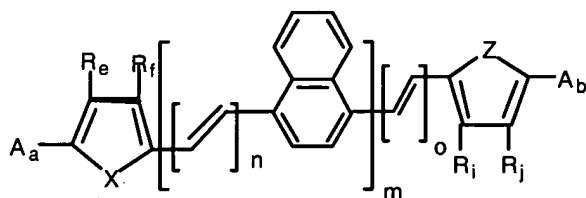
R_{g1} , R_{g2} , and R_{g3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene; cyanuric chloride and derivatives thereof; and methacryloyl chloride.

8-12. (Cancelled)

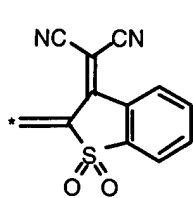
13. (Currently Amended) A method for preparing a compound in an electronically excited state, comprising the steps of:

a) exposing a compound having the formula D_1 - Π - D_2 to radiation, wherein D_1 and D_2 are electron donor groups; and Π comprises a bridge of π -conjugated bonds connecting D_1 and D_2 ; and

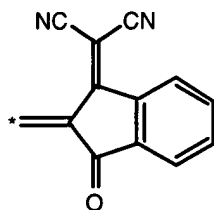
b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state, wherein said compound is further defined by a formula



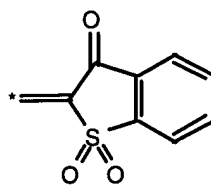
where A_a and A_b are independently selected from the group consisting of: CHO; CN; NO_2 ; Br; Cl; and I; and



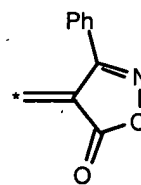
A1



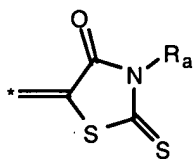
A2



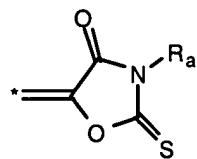
A3



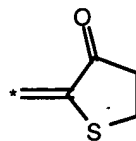
A4



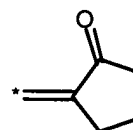
A5



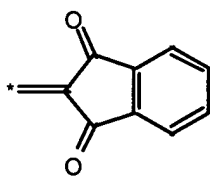
A6



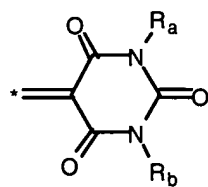
A7



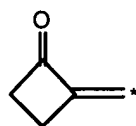
A8



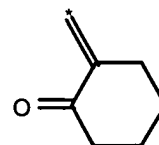
A9



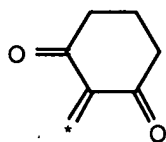
A10



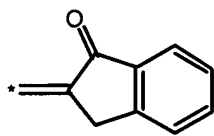
A11



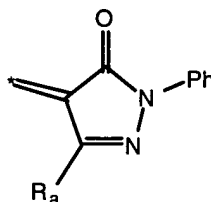
A12



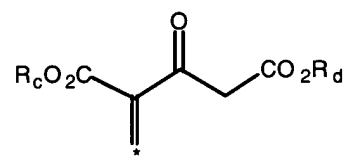
A13



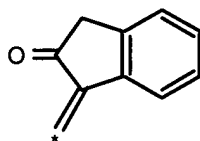
A14



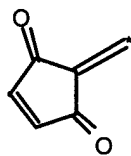
A15



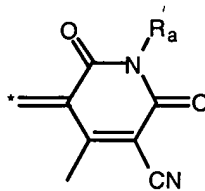
A16



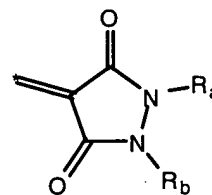
A17



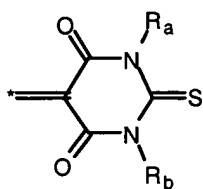
A18



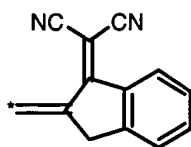
A19



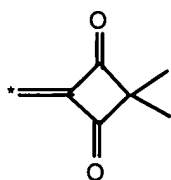
A20



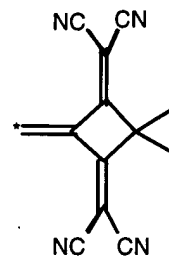
A21



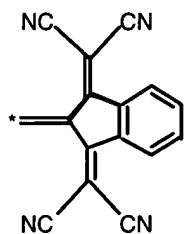
A22



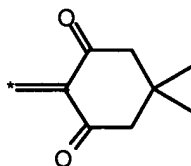
A23



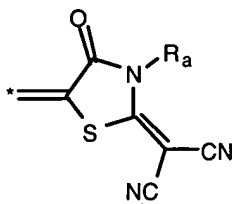
A24



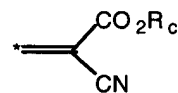
A25



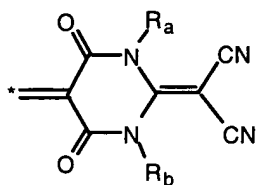
A26



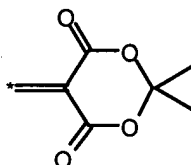
A27



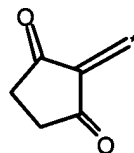
A28



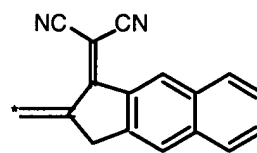
A29



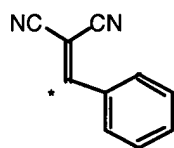
A30



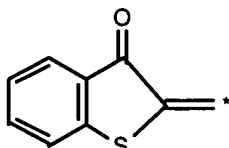
A31



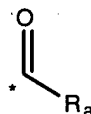
A32



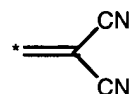
A33



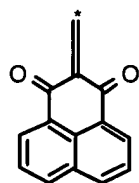
A34



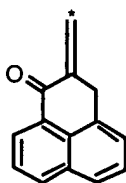
A35



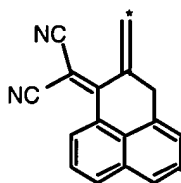
A36



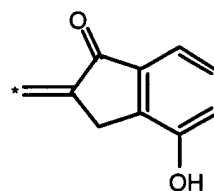
A37



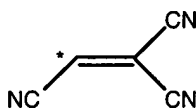
A38



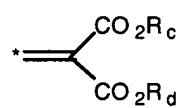
A39



A40



A41



A42

in addition R_a and R_b are independently selected from the group consisting of: Br, Cl, and I;

where * indicates the point of attachment of A1-A42 to the atom to which it is to be attached;

-and where $0 \leq m \leq 10$, $0 \leq n \leq 10$, $0 \leq o \leq 10$, and $m + n + o \geq 1$; and where:

X, Y, and Z are independently selected from the group consisting of: $CR_k=CR_l$; O; S; and N- R_m ;

R_a , R_b , R_c , R_d are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where $0 < \alpha < 10$ and $1 < \beta < 25$, a group of aromatic rings having up to 20 carbons in the aromatic ring framework; fused aromatic rings, vinyl; allyl; 4-styryl; acrolyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins; $-(CH_2)_\delta SiCl_3$; $-(CH_2)_\delta Si(OCH_2CH_3)_3$; and $-(CH_2)_\delta Si(OCH_3)_3$; where $\delta < 25$;

R_{a1} , R_{a2} , and R_{a3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, and methacryloyl chloride;

R_e , R_f , R_i , R_j , R_k , R_l and R_m are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$, where R_{b1} , R_{b2} , and R_{b3} are independently selected from the group consisting of a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof; methacryloyl chloride; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where $0 < \alpha < 10$ and $1 < \beta < 25$; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO₂; Br; Cl; I; phenyl; an acceptor group containing more than two carbon atoms; a functional group derived from an amino acid and $NR_{e1}R_{e2}$; OR_{e3} ; where R_{e1} , R_{e2} , R_{e3} are defined as for R_n and R_o , where R_n and R_o are defined as any member of the group

consisting of H; a linear or branched alkyl group with up to 25 carbons;

$-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{OR}_{g1}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{NR}_{g2}\text{R}_{g3}$;

$-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CONR}_{g2}\text{R}_{g3}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CN}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Cl}$;

$-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Br}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{I}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{-Phenyl}$; aryl groups;

fused aromatic rings; and polymerizable functionalities; and

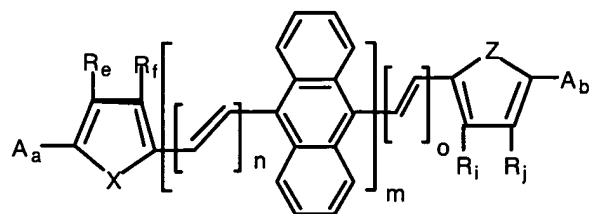
~~R_{g1} , R_{g2} , and R_{g3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene; cyanuric chloride and derivatives thereof and methacryloyl chloride~~

R_{g1} , R_{g2} , and R_{g3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene; cyanuric chloride and derivatives thereof; and methacryloyl chloride.

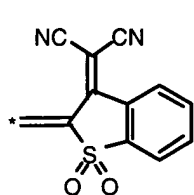
14. (Currently Amended) A method for preparing a compound in an electronically excited state, comprising the steps of:

a) exposing a compound having the formula $\text{D}_1\text{-}\Pi\text{-D}_2$ to radiation, wherein D_1 and D_2 are electron donor groups; and Π comprises a bridge of π -conjugated bonds connecting D_1 and D_2 ; and

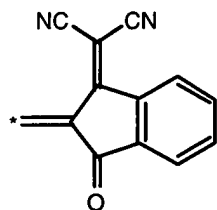
b) converting said compound to a multi-photon electronically excited state upon simultaneous absorption of at least two photons of said radiation by said compound, wherein the sum of the energies of all of said absorbed photons is greater than or equal to the transition energy from a ground state of said compound to said multi-photon excited state and wherein the energy of each absorbed photon is less than the transition energy between said ground state and the lowest single-photon excited state of said compound and is less than the transition energy between said multi-photon excited state and said ground state, wherein said compound is further defined by a formula



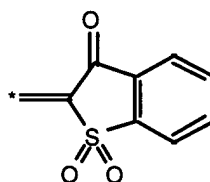
where A_a and A_b are independently selected from the group consisting of: CHO; CN; NO_2 ; Br, Cl; I; and



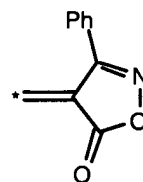
A1



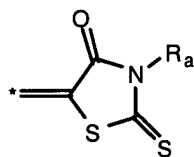
A2



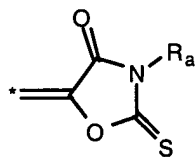
A3



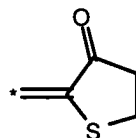
A4



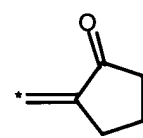
A5



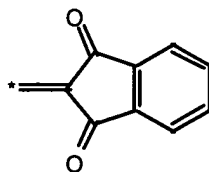
A6



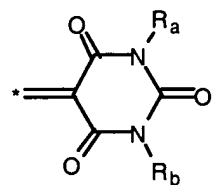
A7



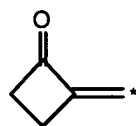
A8



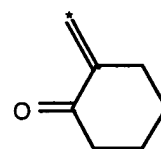
A9



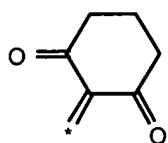
A10



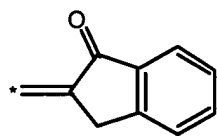
A11



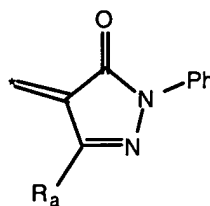
A12



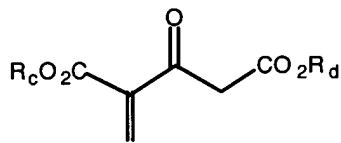
A13



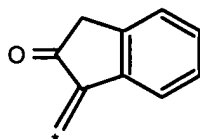
A14



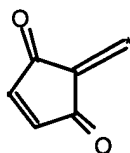
A15



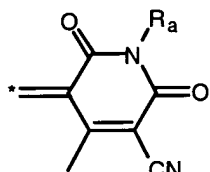
A16



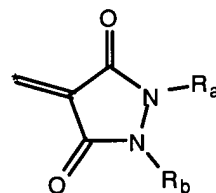
A17



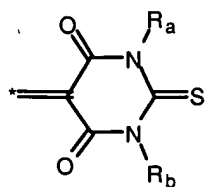
A18



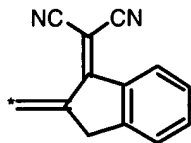
A19



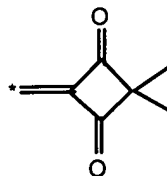
A20



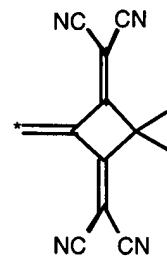
A21



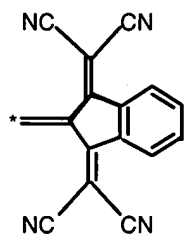
A22



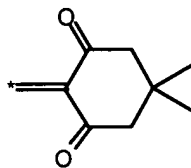
A23



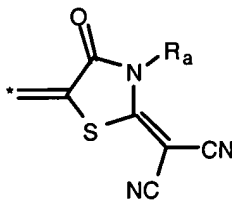
A24



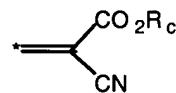
A25



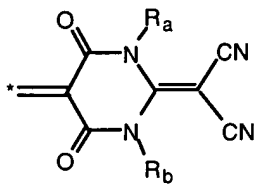
A26



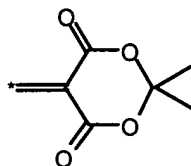
A27



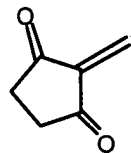
A28



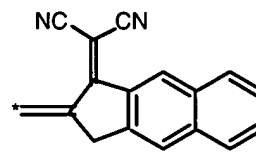
A29



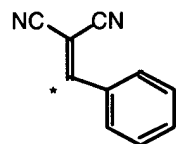
A30



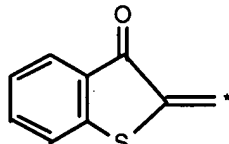
A31



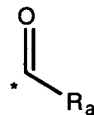
A32



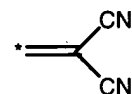
A33



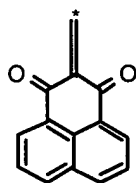
A34



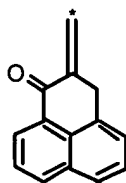
A35



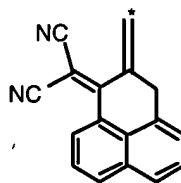
A36



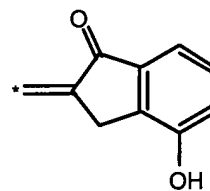
A37



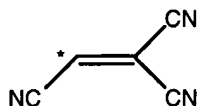
A38



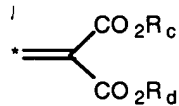
A39



A40



A41



A42

in addition A_a and A_b are independently selected from the group consisting of: Br, Cl, and I;

where * indicates the point of attachment of A1-A42 to the atom to which it is to be attached;

-and where $0 \leq m \leq 10$, $0 \leq n \leq 10$, $0 \leq o \leq 10$, and $m + n + o \geq 1$; and where:

X , Y , and Z are independently selected from the group consisting of: $CR_k=CR_l$; O; S; and $N-R_m$;

R_a , R_b , R_c , R_d are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{a1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{a2}R_{a3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl; where $0 < \alpha < 10$ and $1 < \beta < 25$, a group of aromatic rings having up to 20 carbons in the aromatic ring framework; fused aromatic rings, vinyl; allyl; 4-styryl; acrolyl; methacroyl; acrylonitrile, isocyanate; isothiocyanate; epoxides; strained ring olefins; $-(CH_2)_\delta SiCl_3$; $-(CH_2)_\delta Si(OCH_2CH_3)_3$; and $-(CH_2)_\delta Si(OCH_3)_3$; where $\delta < 25$;

R_{a1} , R_{a2} , and R_{a3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons, a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof, and methacryloyl chloride;

R_e , R_f , R_i , R_j , R_k , R_l and R_m are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{b1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{b2}R_{b3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CONR_{b2}R_{b3}$, where R_{b1} , R_{b2} , and R_{b3} are independently selected from the group consisting of a functional group derived from an amino acid; a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene, ruthenocene, cyanuric chloride and derivatives thereof and methacryloyl chloride; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$ -Phenyl, where $0 < \alpha < 10$ and $1 < \beta < 25$; a group of aromatic rings having up to 20 carbons in the aromatic framework; fused aromatic rings; CHO; CN; NO₂; Br; Cl; I; phenyl; an acceptor group containing more than two carbon atoms; a functional group derived from an amino acid and $NR_{e1}R_{e2}$; OR_{e3} ; where R_{e1} , R_{e2} , R_{e3} are defined as for R_n and R_o , where R_n and R_o are defined as any member of the group

consisting of H; a linear or branched alkyl group with up to 25 carbons;

$-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{OR}_{g1}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{NR}_{g2}\text{R}_{g3}$;

$-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CONR}_{g2}\text{R}_{g3}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{CN}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Cl}$;

$-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{Br}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{I}$; $-(\text{CH}_2\text{CH}_2\text{O})_\alpha-(\text{CH}_2)_\beta\text{-Phenyl}$; aryl groups;

fused aromatic rings; and polymerizable functionalities; and

R_{g1} , R_{g2} , and R_{g3} are independently selected from the group consisting of: H; a linear or branched alkyl group with up to 25 carbons; a functional group derived from an amino acid; or a polypeptide; adenine; guanine; tyrosine; cytosine; uracil; biotin; ferrocene; ruthenocene; cyanuric chloride and derivatives thereof; and methacryloyl chloride.

15. (Cancelled)